INTERNATIONAL JOURNAL OF TECHNOLOGICAL EXPLORATION AND LEARNING (IJTEL)
www.ijtel.org

Experimental Investigations of CI Engine by using Different Blends of Neat Karanja Oil and Diesel at Different Injection Pressures

Dr. A. G. Matani
Associate Professor – Mechanical Engineering
Government College of Engineering
Amravati, India

Mukesh, A. Mane
M. Tech. II Year (Thermal Engineering),
Government College of Engineering
Amravati, India

***Abstract*—In the present Investigation experimental work has been carried out to analyze the performance characteristics of single cylinder compression ignition direct ignition fuelled with blends of neat Karanja oil and diesel at different injection pressure. As the blending with diesel increases the viscosity decreases. Brake thermal efficiency of diesel fuel is nearly equal to the brake thermal efficiency of blends10B and 20B. Brake specific fuel consumption increases as the blending proportion increases due to low calorific value of blends.**

***Keywords-** karanja; Injection Pressure, Diesel Engine, Performance.*

I. INTRODUCTION

The world is presently confronted with the twin crises of fossil fuel depletion and environmental degradation. Indiscriminate extraction and lavish consumption of fossil fuels have led to reduction in underground-based carbon resources. The search for alternative fuels, which promise a harmonious correlation with sustainable development, energy conservation, efficiency and environmental preservation, has become highly pronounced in the present context. Fuels are inevitable for industrial development a growth of any country. The life span of fossil fuel resources has been terrifying. Biodiesel, a renewable source of energy seems to be an ideal solution for global energy demands including India as well.

II. EXPERIMENTAL SET UP AND PROCEDURE

A single cylinder direct injection type, 4 stroke, air cooled vertical diesel engine developing 3.7 kW at 1500 rpm is coupled with rope brake dynamometer for experimentation purpose. Control panel consists of engine speed indicator which indicates the speed of engine in RPM. Fuel consumption was measured by a glass burette mounted on the control panel. The dynamometer consists of a pulley coupled to the engine as shown in Figure 1. A thick rope is wound around the pulley. One end of the pulley is connected to lead screw that can be rotated by wheel mounted on it and other end is connected to a spring balance. Load can be applied by rotating the wheel. As the rope is tightened around the pulley, engine is loaded and the spring balance shows the load in kg. The specification of engine shown in Table .1

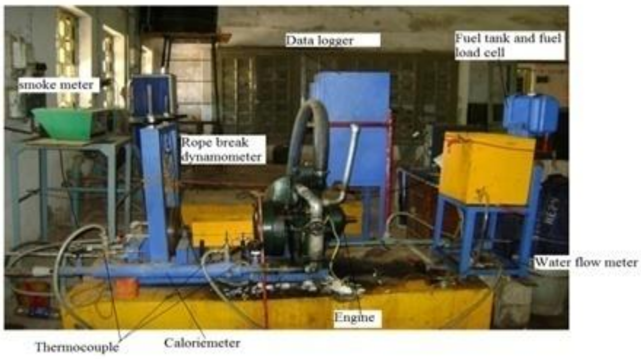

Fig :Exeperimental set up

TABLE I. SPECIFICATION OF ENGINE

Sr. No	Component	Unit	Description
1	Name of the engine		Kirloskar Oil Engine
2	Type of engine	-	Four stroke single cylinder CI engine
3	No. of cylinder	-	1
4	IS Rating at 1500 rpm	kW(Bhp)	3.7 (5.0)
5	Bore	MM	80
6	Stroke	MM	110
7	Compression Ratio		17.5:1
8	Method of cooling	-	Air

III. RESULTS AND DISCUSSIONS

Results show the performance of different blends i.e. 10B, 20B, 30B, 40B and diesel at different injection pressure. Different graphs show the performance of different blends at different loading conditions and different injection pressures.

A. Brake thermal efficiency (BTE)

Following graph shows the performance of different blends at different injection pressure. As the load increases the BTE increase at full load the BTE is high from result it shows that the BTE of diesel is equal to the BTE of 10B and 20B.From which we can say that the blends up to 20B can be used as the fuel for the engine without any modification as the blending proportion increases the efficiency decreases, but as the injection pressure increases the BTE also increases.

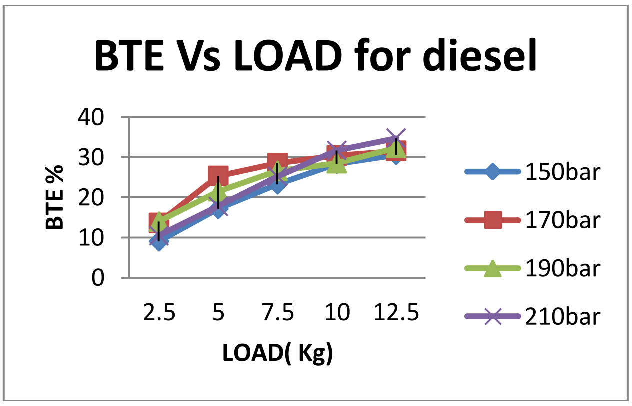

Figure 1. variation of brake thermal efficiency with load for diesel.

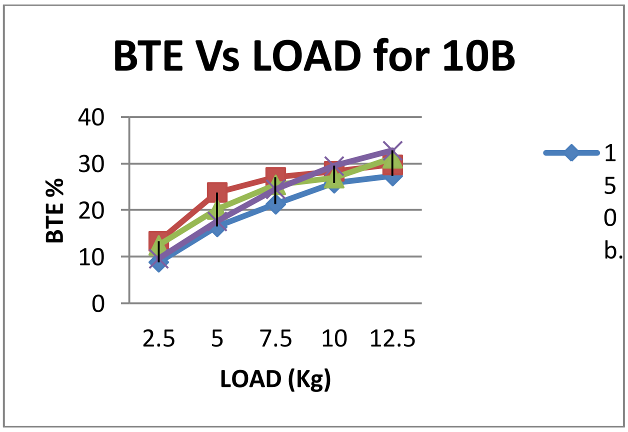

Figure 2. variation of brake thermal efficiency with load for 10B

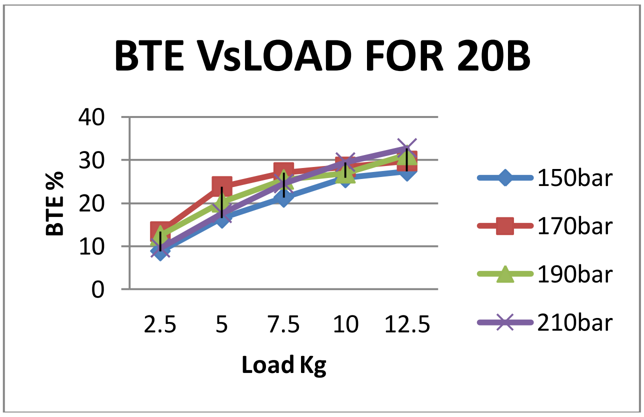

Figure 3. variation of brake thermal efficiency with load for 20B

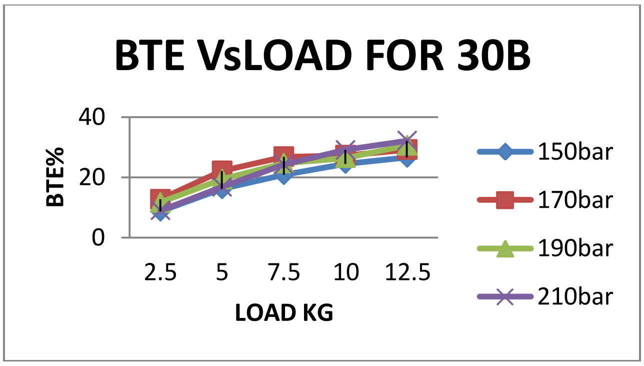

Figure 4. Variation of brake thermal efficiency with load for 30B

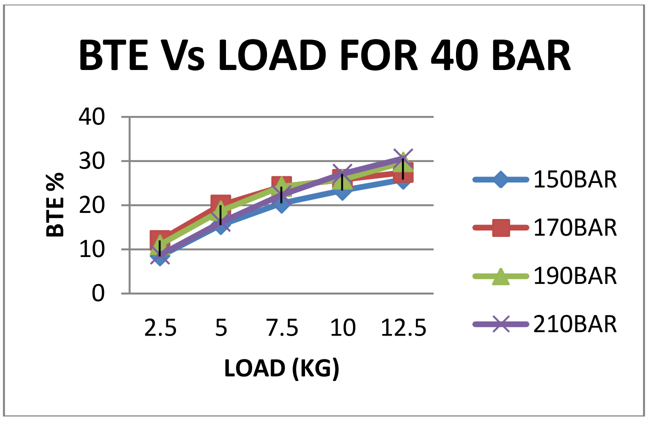

Figure 5. Variation of brake thermal efficiency with load for 40B

B. Brake specific fuel consumption (BSFC)

Following graphs shows the performance of BSFC at different injection pressure and different loading. From graph we can say that as the load on the engine increases the brake specific fuel consumption decreases.as the injection pressure increses the BSFC deceresses, but as the blending proportion increses in diesel the BSFC also increses.

For disesl and blends (10B and 20B) BSFC observed nearly equal. So we can say that the blends up to 20B can be used as fuel for direct injection C.I engine. Also the performance at injection pressure 190 bar get better than other I.P without any modification in engine.

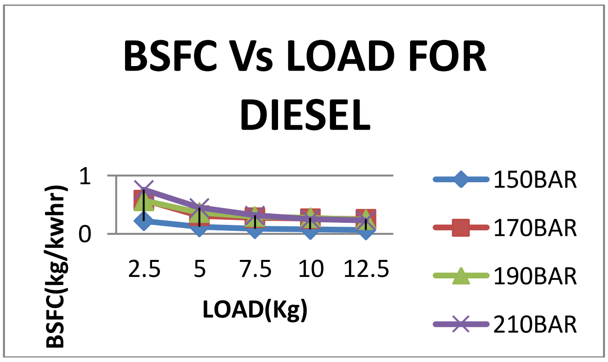

Figure 6. Variation of brake specific fuel consumption with load for Diesel

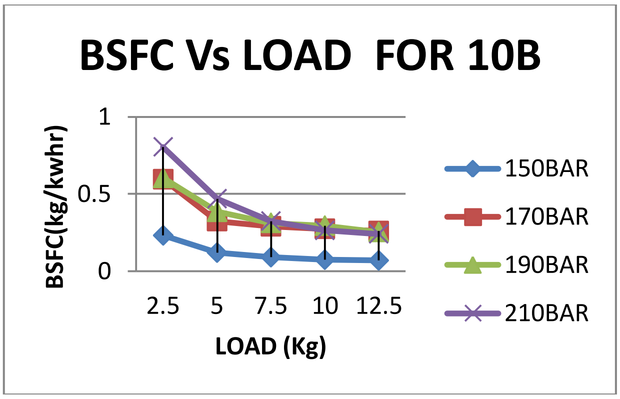

Figure 7. Variation of brake specific fuel consumption with load for 10B

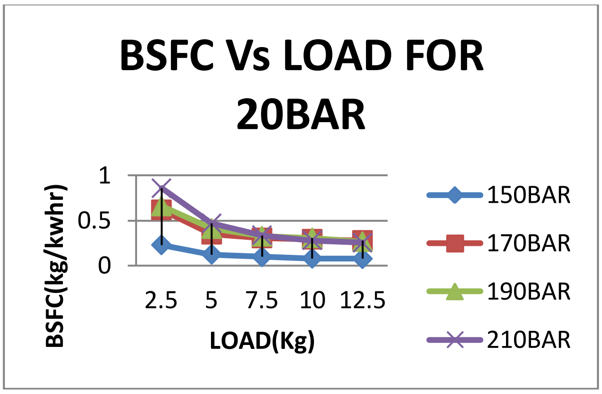

Figure 8. Variation of brake specific fuel consumption with load for 20B

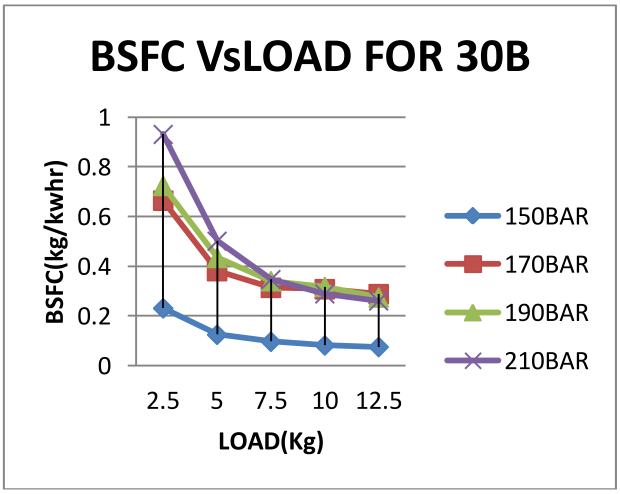

Figure 9. Variation of brake specific fuel consumption with load for 30B

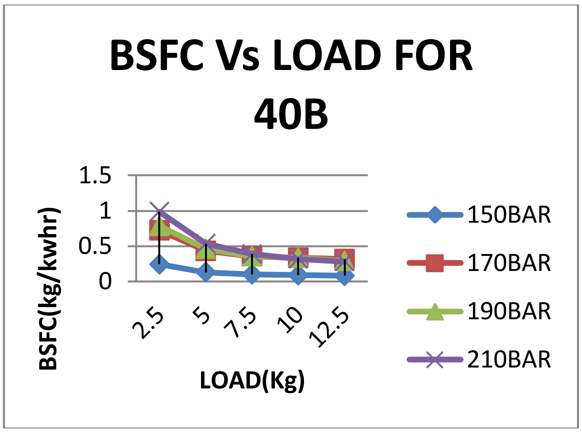

Figure 10. Variation of brake specific fuel consumption with load for 40B

IV. CONCLUSIONS

Various blends of neat Karanja oil and diesel have good potential to use as alternative fuel in diesel engine. As the blending with diesel increases the viscosity decreases. brake thermal efficiency of diesel fuel is nearly equal to the brake thermal efficiency of blends10B and 20B. Brake specific fuel consumption increases as the blending proportion increases due to low calorific value of blends. From these result we can conclude that the at injection pressure 190 bar gives better performance for blends up to 20% without any modification in engine.

REFERENCES

[1] Avinash Kumar Agarwal, AtulDhar (2013), Experimental investigations of performance, emission and combustion characteristics of Karanja oil blends fuelled DICI engine, Renewable Energy, 52 (2), pp. 283-291.

[2] A.S. Ramadhas, S. Jayaraj, C. Muraleedharan (2004), Use of vegetable oils as I.C. engine fuels, Renewable Energy, 29 (2) pp.727–742.

[3] Avinash Kumar Agrawal, (2007), Biofueuls (alcohols and biodiesel) application as fuels for internal combustion engines progress, Energy and Combustion Science, 33, pp.233-271.

[4] Avinash Kumar Agrawal, K.Rajamanoharan, (2009), Experimental investigations of performance and emission of Karanja oil and its blend in a single cylinder diesel engine Applied Energy, 86, (2), pp.106-112.

[5] B. Baiju, M.K. Naik, L.M. Das (2009), A comparative evaluation of compression ignition engine characteristics using methyl and ethyl esters of Karanja oil, Renewable Energy, 34 (2), pp. 1616–1621.

[6] Dr. A. G. Matani. Effective energy conservation techniques in industries, International Journal of Mechanical Engineering & Technology (IJMET), 2013, 4(1) , pp. 4 – 7.

[7] Dr. A. G. Matani,(1998), Fly ash from thermal power stations: Utilization and disposal techniques, Research Journal of Chemistry and Environment, 2(1), pp.. 71-78.

[8] Dr A. G Matani, Curricula Challenges of Technical and Management Education Institutions , International Journal of Management (IJM), 2013, 4(1), pp. 56-60.

[9] Dr. A. G. Matani, Effective energy conservation techniques in industries, International Journal of Mechanical Engineering & Technology (IJMET), 2013, 4(1), pp.74-78.

[10] Dr. A. G. Matani, Managing new product innovations, Industrial Engineering Journal, 1999, 4 (1), pp. 21-23.

[11] Dr. A.G. Matani, Strategies for better waste management in industrial estates. Journal of Industrial Pollution Control, 2006, 22(1), pp. 67-72.